

2/21/03 09/536,460

FILE 'REGISTRY' ENTERED AT 13:50:03 ON 21 FEB 2003

E AG CL/MF  
L1 2 S E3  
E AG CL/ELF  
L2 142 S E3  
E BR CS/MF  
L3 3 S E3  
E BR CS/ELF  
L4 29 S E3  
L5 173 S L1-4

FILE 'HCAPLUS' ENTERED AT 13:51:55 ON 21 FEB 2003

L6 109 S SURFACE FIGURE  
L7 2498 S ATHERMAL####  
L8 1 S L6 AND L7  
L9 31120 S NONTHERMAL? OR NON THERMAL? OR (THERMAL### OR HEAT#### OR TEM  
L10 1 S L6 AND L9  
L11 9650 S L5  
L12 45 S L11 AND L6-9  
L13 0 S L11 AND L6 AND (L7 OR L9)  
L14 0 S L11 AND L6  
L15 45 S L11 AND (L7 OR L9)  
L16 2 S L15 AND (SURFACE OR POLISH? OR ROUGH? OR FINISH?)  
E OPTIC/CT  
E OPTICAL DEVICE/CT  
E OPTICS/CT  
E E3+ALL/CT  
E E19+ALL/CT

FILE 'STNGUIDE' ENTERED AT 14:01:36 ON 21 FEB 2003

FILE 'HCAPLUS' ENTERED AT 14:01:47 ON 21 FEB 2003

L17 31710 S E2-20  
L18 37737 S E21-50  
L19 102643 S E51-75  
L20 22441 S E76-100  
L21 22343 S E101-125  
L22 42553 S E126-150  
L23 60333 S E151-180  
L24 17 S L6 AND L17-23

FILE 'HCAPLUS' ENTERED AT 14:53:36 ON 21 FEB 2003

L25 1 S L6 AND L7  
L26 45 S L5 AND (L7 OR L9)  
L27 0 S L24 AND L5  
L28 10 S L26 AND (?OPTIC? OR LIGHT##### OR ILLUMINA##### OR FLUORESC#  
L29 1 S L28 AND (POLISH##### OR SURFACE)

FILE 'STNGUIDE' ENTERED AT 14:58:16 ON 21 FEB 2003

FILE 'HCAPLUS' ENTERED AT 14:59:40 ON 21 FEB 2003

L30 9 S L28 NOT L29

FILE 'STNGUIDE' ENTERED AT 15:00:05 ON 21 FEB 2003

FILE 'HCAPLUS' ENTERED AT 15:06:20 ON 21 FEB 2003

L31 83595 S (SMOOTH##### OR ROUGH##### OR DAMAG##### OR POLISH#####) (1  
L32 319 S L5(L) (SURFACE OR MIRROR OR REFLECT##### OR ANTIREFLECT#####  
L33 10 S L31 AND L32  
L34 10 S L33 NOT L28

FILE 'STNGUIDE' ENTERED AT 15:08:24 ON 21 FEB 2003

FILE 'HCAPLUS' ENTERED AT 15:09:44 ON 21 FEB 2003

FILE 'STNGUIDE' ENTERED AT 15:09:52 ON 21 FEB 2003

FILE 'HCAPLUS' ENTERED AT 15:10:35 ON 21 FEB 2003

L35 30225 S L5 OR AGCL OR CSBR OR (AG OR SILVER) (W) CHLORIDE OR ("CS" OR C  
L36 33630 S L9 OR (THERMAL## OR TEMP OR TEMPERATURE OR HEAT##) (2A) (NON

2/21/03 09/536,460

L37 87 S L35 AND L36  
L38 6 S L37 AND (CTE OR EXPAN#####)  
L39 2 S L37 AND REFRACT#####  
L40 7 S L38-39

FILE 'STNGUIDE' ENTERED AT 15:48:21 ON 21 FEB 2003

FILE 'HCAPLUS' ENTERED AT 15:53:35 ON 21 FEB 2003  
L41 0 S L37 AND SURFACE FIGURE

FILE 'HCAPLUS' ENTERED AT 15:53:57 ON 21 FEB 2003  
L42 0 S L37 AND SURFACE AND PEAK(2A)VALLEY  
L43 9 S L37 AND SURFACE  
L44 0 S L37 AND PEAK(2A)VALLEY

FILE 'STNGUIDE' ENTERED AT 15:54:53 ON 21 FEB 2003

FILE 'HCAPLUS' ENTERED AT 15:58:09 ON 21 FEB 2003  
L45 275 S L5(L) SURFACE  
L46 1 S L36 AND L45

FILE 'EUROPATFULL, PCTFULL' ENTERED AT 15:59:53 ON 21 FEB 2003  
L47 4778 S SURFACE FIGURE OR (SURFACE(5A)VALLEY AND PEAK(2A)VALLEY AND S  
L48 401 S SURFACE(6A) (AGCL OR CSBR OR (AG OR SILVER) (W)CHLORIDE OR ("CS  
L49 9 S L47 AND L48

FILE 'STNGUIDE' ENTERED AT 16:01:57 ON 21 FEB 2003

FILE 'EUROPATFULL, PCTFULL' ENTERED AT 16:04:16 ON 21 FEB 2003  
L50 5883 S (ATHERMAL### OR NONTHERMAL? OR NON THERMAL### OR (THERMAL##  
L51 2 S L48 AND L50

FILE 'STNGUIDE' ENTERED AT 16:05:29 ON 21 FEB 2003

FILE 'DPCI' ENTERED AT 16:06:32 ON 21 FEB 2003  
L52 0 S US6486999/PN.G

FILE 'STNGUIDE' ENTERED AT 16:06:55 ON 21 FEB 2003

FILE 'DPCI' ENTERED AT 16:08:05 ON 21 FEB 2003  
L53 43 S (US4497544 OR US4615587 OR US4886331 OR US5212584 OR US545979  
SEL PRN

FILE 'HCAPLUS' ENTERED AT 16:08:28 ON 21 FEB 2003  
L54 20 S E1-63  
L55 0 S L35 AND L54

FILE 'DPCI' ENTERED AT 16:09:16 ON 21 FEB 2003  
L56 88 S (US4497544 OR US4615587 OR US4886331 OR US5212584 OR US545979  
SEL PRN

FILE 'HCAPLUS' ENTERED AT 16:09:42 ON 21 FEB 2003  
L57 31 S E64-186  
L58 0 S L35 AND L57

FILE 'DPCI' ENTERED AT 16:10:25 ON 21 FEB 2003  
L59 88 S (US4497544 OR US4615587 OR US4886331 OR US5212584 OR US545979  
SEL PN.D  
DELETE EXPAND  
SET SMARTSELECT ON  
L60 SEL L59 1- PN.D : 847 TERMS  
L61 SEL L59 1- PN.G : 744 TERMS  
L62 SEL L59 1- PRN : 123 TERMS  
L63 6953 S L60  
L64 4810 S L61  
L65 118 S L62  
L66 10837 S L63 OR L64 OR L65  
L67 839 S L66 AND SURFACE  
L68 2378 S L66 AND G02F?/IC  
L69 4679 S L66 AND OPTIC#####

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L70        0 S L66 AND (CESIUM OR CS OR CSBR OR BROMIDE)  
L71        51 S L66 AND (AGCL OR AG OR SILVER)  
L72        1944 S L66 AND (POLISH? OR MIRROR? OR REFLECT? OR ANTIREFLECT? OR WI  
L73        539 S L67 AND (L68-69 OR L72)  
L74        589 S L71 OR L73  
L75        SEL L74 1- PRN :        913 TERMS

FILE 'HCAPLUS' ENTERED AT 16:16:43 ON 21 FEB 2003

L76        234 S L75  
L77        2 S L35 AND L76

21feb03 16:28:54 User259284 Session D2112.1

SYSTEM:OS - DIALOG OneSearch  
File 2:INSPEC 1969-2003/Feb W2  
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File 94:JICST-EPlus 1985-2003/Feb W3  
(c) 2003 Japan Science and Tech Corp(JST)  
\*File 94: UDs have been adjusted to reflect current months data. There is no data missing.  
File 95:TEME-Technology & Management 1989-2003/Feb W1  
(c) 2003 FIZ TECHNIK  
File 96:FLUIDEX 1972-2003/Feb  
(c) 2003 Elsevier Science Ltd.  
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(c) 2003 The HW Wilson Co.  
File 103:Energy SciTec 1974-2003/Feb B1  
(c) 2003 Contains copyrighted material  
\*File 103: For access restrictions see Help Restrict.  
File 118:ICONDA-Intl Construction 1976-2003/Feb  
(c) 2003 Fraunhofer-IRB  
File 144:Pascal 1973-2003/Feb W2  
(c) 2003 INIST/CNRS  
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(c) 2003 American Mathematical Society  
File 240:PAPERCHEM 1967-2003/Feb W3  
(c) 2003 Elsevier Eng. Info. Inc.  
File 248:PIRA 1975-2003/Feb W3  
(c) 2003 Pira International  
\*File 248: Changes have been made to Subject Headings and Codes as of July 2002. See Help Codes248 for a complete list of Subject Headings.  
File 315:ChemEng & Biotec Abs 1970-2002/Dec  
(c) 2002 DECHEMA  
File 323:RAPRA Rubber & Plastics 1972-2003/Feb  
(c) 2003 RAPRA Technology Ltd  
\*File 323: Alert feature enhanced for multiple files, duplicate removal, customized scheduling. See HELP ALERT.  
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec  
(c) 1998 Inst for Sci Info

2/21/03 09/536,460

File 350:Derwent WPIX 1963-2003/UD,UM &UP=200312  
(c) 2003 Thomson Derwent  
\*File 350: Alerts can now have images sent via all delivery methods.  
See HELP ALERT and HELP PRINT for more info.  
File 347:JAPIO Oct 1976-2002/Oct(Updated 030204)  
(c) 2003 JPO & JAPIO  
\*File 347: JAPIO data problems with year 2000 records are now fixed.  
Alerts have been run. See HELP NEWS 347 for details.

| Set | Items | Description   |
|-----|-------|---|
| S1  | 753   | AU=(HAYDEN J? OR CONZONE S? OR MARKER A?)   |
| S2  | 807   | AU=(HAYDEN, J? OR CONZONE, S? OR MARKER, A?)  |
| S3  | 1464  | S1:S2   |
| S4  | 0     | S3 AND (AGCL OR (AG OR SILVER) ()CHLORIDE? ? OR CSBR OR CES-IUM()BROMIDE? ?)                                  |
| S5  | 18    | (SCHOTT OR CS=SCHOTT? OR PA=SCHOTT?) AND (AGCL OR (AG OR SILVER) ()CHLORIDE? ? OR CSBR OR CESIUM()BROMIDE? ?) |
| S6  | 14    | RD S5 (unique items)  |
| S7  | 28462 | (AGCL OR (AG OR SILVER) ()CHLORIDE? ? OR CSBR OR CESIUM()BROMIDE? ?)  |
| S8  | 0     | S7 AND (AGERE OR HEWLETT()PACKARD OR CS=HEWLETT? OR PA=HEWLETT?)  |
| S9  | 56    | S7 AND (CORNING? OR CS=CORNING? OR PA=CORNING?)   |
| S10 | 2     | S7 AND (AGERE OR HEWLETT()PACKARD OR CS=HEWLETT? OR PA=HEWLETT? OR PA=AGERE? OR CS=AGERE?)                    |
| S11 | 58    | S9:S10  |
| S12 | 54    | RD S11 (unique items)   |
| S13 | 14    | S12 AND (ATHERMAL? OR NONTHERMAL? OR TEMPERATURE? ? OR THERMAL??)   |
|     | ?     |   |

L77 ANSWER 2 OF 2 HCPLUS COPYRIGHT 2003 ACS  
 AN 1981:452773 -HCPLUS  
 DN 95:52773  
 TI Silver halide-containing film for optical data storage  
 IN Borrelli, Nicholas Francis; Young, Peter Lung-Chung  
 PA Corning Glass Works , USA  
 SO Ger. Offen., 20 pp.  
 CODEN: GWXXBX  
 DT Patent  
 LA German  
 IC G03C001-46; G11B007-24  
 CC 74-8 (Radiation Chemistry, Photochemistry, and Photographic Processes)  
 FAN.CNT 1

|      | PATENT NO.    | KIND | DATE         | APPLICATION NO. | DATE         |
|------|---------------|------|--------------|-----------------|--------------|
| PI   | DE 3039500    | A1   | 19810430     | DE 1980-3039500 | 19801020 <-- |
|      | GB 2065317    | A    | 19810624     | GB 1980-33732   | 19801020 <-- |
|      | GB 2065317    | B2   | 19830706     |                 |              |
|      | NL 8005793    | A    | 19810424     | NL 1980-5793    | 19801021 <-- |
|      | FR 2468147    | A1   | 19810430     | FR 1980-22463   | 19801021 <-- |
|      | FR 2468147    | B1   | 19870130     |                 |              |
|      | JP 56094345   | A2   | 19810730     | JP 1980-148107  | 19801022 <-- |
| PRAI | US 1979-86813 |      | 19791022 <-- |                 |              |

AB Inorg. film which is optically bleachable and absorbs in the visible region contains several polycryst. Ag halide layers with additively colored AgCl crystals, has a thickness of .1toreq.2 .mu.m, in the unbleached state exhibits a transparency to 6300 .ANG. of .1toreq.0.3 and to 8500 .ANG., .gtoreq.0.5, and on a supporting film is useful in optical data storage. The support may be transparent glass with or without a light-reflecting metallic film over which is a barrier layer of metallic oxide. Thus, a reflecting-type data storage system was prep'd. on a silvered glass plate with an optically transparent 500-.ANG. Ta2O5 barrier layer by adding 40 300-.ANG. AgCl layers alternating with 39 9-.ANG. PbO layers. A point-like spot on the film was bleached with 6329-.ANG. laser light of incident energy 1000 W/qcm for 0.6 ms and its optical anisotropy was detd. The net transparency of 1.8% at 8500 .ANG. and the 0.1% transparency of the background gave a contrast ratio of 18:1. These multilayer films have many advantages: they can be erased and reused repeatedly without change in their properties; a strong reading source can be used without danger of erasure to give a strong signal with little distortion; by suitable arrangement of the stored data a scale of optical d. can be prep'd., which makes possible analog operation.

IT 7783-90-6, uses and miscellaneous

RL: USES (Uses)

(optical data storage films contg. alternating layers of lead oxide and)

RN 7783-90-6 HCPLUS

CN Silver chloride (AgCl) (9CI) (CA INDEX NAME)

Ag-Cl

L40 ANSWER 6 OF 7 HCAPLUS COPYRIGHT 2003 ACS  
 AN 1965:413614 HCAPLUS  
 DN 63:13614  
 OREF 63:2414a-c  
 TI The thermal **expansion** of alkali [metal] halides at low temperatures  
 AU White, G. K.  
 CS Div. Phys., C.S.I.R.O., Sydney  
 SO Proc. Roy. Soc. (London), Ser. A (1965), 286(1405), 204-17  
 DT Journal  
 LA English  
 CC 3 (General Physical Chemistry)  
 AB Linear thermal **expansions** of 8 alkali metal halides were detd. at liquid O temps. and at temps. from 30.degree.K. down to 2.degree.K. For temps.  $T \approx \theta_0 / 20$ , where  $\theta_0$  is the Debye temp., the **expansion** coeffs. are well represented by  $\alpha = AT^3 + BT^6$ . Values are reported for the Grueneisen parameter  $\gamma = 3\alpha$ .  $V/C\chi$ , where  $C/V$  is the heat capacity per unit vol. and  $\chi$  is the compressibility. For CsBr (body-centered-cubic structure)  $\gamma$  is nearly **independent** of **temp.**, with a value of 2.0, but for the other crystals, which have the rock-salt structure, the parameter  $\gamma$  varies with temp., chiefly between  $\theta_0/10$  and  $\theta_0/5$ . At room temp.,  $\gamma$  lies between 1.45 and 1.7 but at low temp. this generally decreases to a value  $\gamma_0$  which is approx. -0.1 for RbI; +0.3 for KCl, KBr, and KI; and 1.0 for NaCl and NaI. LiF does not show this decrease,  $\gamma_0$  being 1.7. The values observed for  $\gamma_0$  are compared with those calcd. from elastic consts. and their pressure derivs. and the general behavior of  $\gamma(T)$  is observed to conform qual. to the predictions of simple theoretical models of Born (Atom Theorie des festen Zustandes, Leipzig: Teubner, 1923), Blackman (CA 54, 20396g), and Barron (CA 51, 12587h).  
 IT 7787-69-1, Cesium bromide  
     (**expansion** (thermal) and Grueneisen const. of)  
 RN 7787-69-1 HCAPLUS  
 CN Cesium bromide (CsBr) (9CI) (CA INDEX NAME)

Br--Cs

L77 ANSWER 1 OF 2 HCAPLUS COPYRIGHT 2003 ACS  
 AN 1990:523539 HCAPLUS  
 DN 113:123539  
 TI Nonlinear tunable optical bandpass filter  
 IN Durand, William W.; Peterson, Ronald E.  
 PA Honeywell Inc., USA  
 SO U.S., 5 pp.  
 CODEN: USXXAM  
 DT Patent  
 LA English  
 IC ICM G02B005-28  
 ICS G02F001-23; G02F001-01  
 NCL 350353000  
 CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

FAN.CNT 1

|      | PATENT NO.     | KIND | DATE         | APPLICATION NO. | DATE         |
|------|----------------|------|--------------|-----------------|--------------|
| PI   | US 4929063     | A    | 19900529     | US 1986-821291  | 19860122 <-- |
| PRAI | US 1986-821291 |      | 19860122 <-- |                 |              |

AB Tunable Fabry-Perot filters are described which comprise: a substrate; a 1st coating on the substrate; a 2nd coating, comprising Ag<sub>2</sub>S, which has activatable nonlinear optical properties and an optical thickness equal to 1/2 the design transmittance wavelengths at ambient temp.; a 3rd coating on the 2nd coating, and activating means (e.g., resistance heating or laser radiation means) for changing the optical properties of the 2nd coating. The 1st and 3rd coatings include material selected from AgCl and TlCl.

IT 7783-90-6, Silver chloride (AgCl),  
 uses and miscellaneous

RL: USES (Uses)

(optical filters with coatings contg., tunable Fabry-Perot nonlinear)

RN 7783-90-6 HCAPLUS

CN Silver chloride (AgCl) (9CI) (CA INDEX NAME)

Ag-Cl

L40 ANSWER 2 OF 7 HCPLUS COPYRIGHT 2003 ACS  
AN 1986:540068 HCPLUS  
DN 105:140068  
TI Temperature invariance and universality of Sharma constant of the condensed phase  
AU Sharma, B. K.  
CS Dep. Phys., Reg. Coll. Educ., Bhubaneswar, 751 007, India  
SO Acoustics Letters (1986), 9(7), 101-5  
CODEN: ACLEDI; ISSN: 0140-1599  
DT Journal  
LA English  
CC 65-6 (General Physical Chemistry)  
Section cross-reference(s): 69  
AB For the rare earth metals, cryst. and molten alkali metal halides, molten alkali metals, and a no. of mol. liqs. (including SnCl<sub>4</sub>, CF<sub>4</sub>, and n-alkanes), the Sharma const. [So, a dimensionless no. described previously (S., 1983-4)] was calcd. by using only existing exptl. data on the vol. thermal expansion coeffs. In all cases, So had an av. value of 1.11 +- 0.01, and was essentially independent of the temp.  
IT Alkali metal halides, properties  
RL: PRP (Properties)  
(Sharma dimensionless nos. for cryst. and molten, thermal expansion coeffs. in calcns. of)  
IT 7787-69-1  
RL: PRP (Properties)  
(Sharma dimensionless no. for, thermal expansion coeff. in calcns. of)  
RN 7787-69-1 HCPLUS  
CN Cesium bromide (CsBr) (9CI) (CA INDEX NAME)

Br—Cs

L30 ANSWER 5 OF 9 HCAPLUS COPYRIGHT 2003 ACS  
AN 1970:26652 HCAPLUS  
DN 72:26652  
TI Optical constants of cesium halides at low temperatures in the far infrared  
AU Vergnat, Pierre; Claudel, Jacques; Hadni, Armand; Strimer, Pierre;  
Vermillard, Francois  
CS Inst. Phys. Nancy, Nancy, Fr.  
SO Journal de Physique (Paris) (1969), 30(8-9), 723-35  
CODEN: JOPQAG; ISSN: 0302-0738  
DT Journal  
LA French  
CC 73 (Spectra by Absorption, Emission, Reflection, or Magnetic Resonance, and Other Optical Properties)  
AB The far-ir reflection and transmission spectra of CsX (X = Cl, Br, I) were recorded at various temps. 25-290.degree.K. These and literature spectra were analyzed in terms of 2 Lorentz oscillators. The static dielec. const. increased with temp. However, the high-frequency limit was temp. independent. The main oscillator frequency decreased with increasing temp. Both frequency and damping of the secondary oscillators were temp. independent and strength of these oscillators approached 0 at low temps. due to negligible anharmonicity. For CsI, the strength of the auxiliary oscillator was negligible at every temp.  $\leq 290$ .degree.K. Compressibility was calcd. from Szigeti-theory in terms of the principal oscillator frequency. Agreement between the 2 methods was good at room temp. (within 5%) and was very good at 25.degree.K (within 1%) where harmonicity is assumed more applicable. The ratio of the apparent charge of the ion to that of the electron increased with decreasing anion size and was temp. independent. The longitudinal optical frequency was detd. by 4 different methods as 165, 118, and 91 cm<sup>-1</sup> at 25.degree.K. for CsCl, CsBr, and CsI, resp. The transverse optical frequencies at 25.degree. K. were detd.: 105, 79, and 65 cm<sup>-1</sup> for CsCl, CsBr, and CsI, resp. The optical and dielec. consts. were calcd. for 290.degree., 80.degree., and 25.degree. K for wavelengths <1000 .mu. in the IR region and are tabulated.  
IT 7787-69-1  
RL: PRP (Properties)  
      (optical properties of, in far ir region at low temps.)  
RN 7787-69-1 HCAPLUS  
CN Cesium bromide (CsBr) (9CI) (CA INDEX NAME)

Br—Cs

12/9/5

DIALOG(R) File 2:INSPEC

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03823582 INSPEC Abstract Number: A91034748

Title: Low distortion IR transmitting materials

Author(s): McCarthy Brow, T.; Seegmiller, D.W.

Author Affiliation: US Air Force Weapons Lab., Kirtland AFB, NM, USA

Journal: Proceedings of the SPIE - The International Society for Optical Engineering vol.1307 p.463-73

Publication Date: 1990 Country of Publication: USA

CODEN: PSISDG ISSN: 0277-786X

Conference Title: Electro-Optical Materials for Switches, Coatings, Sensor Optics, and Detectors

Conference Sponsor: SPIE

Conference Date: 16-20 April 1990 Conference Location: Orlando, FL, USA

Language: English Document Type: Conference Paper (PA); Journal Paper (JP)

Treatment: Experimental (X)

Abstract: In general, transmissive optics introduce aberrations into transmitted wavefronts whenever temperature gradients exist within or across the optic. The aberrations result from thermally induced optical path length changes, and materials that minimize the effect are often labeled as 'athermal'. Several groups of materials which appear to meet the criteria for 'athermal' behavior are glasses possessing highly negative thermo-optic coefficients ( $dn/dT$ ). Heavy metal fluoride (HMF), phosphate (PP), fluoro-zirco-aluminate (FZA), and fluorophosphate (FP) glasses exhibit this somewhat unusual property. A program to investigate HMFGs, PPs, FZAs, FPs and other temperature insensitive materials has been initiated. Of particular interest is the effect of glass composition on the refractive index, index temperature dependence, thermal expansion coefficient, and heat capacity. Analyses have shown that the materials under investigation are highly superior to fused silica from a thermally induced optical distortion standpoint. The program has produced a wide variety of glass samples that are now undergoing optical, thermal, and mechanical evaluation. The authors discuss the analyses thus far accomplished. (24 Refs)

Subfile: A

Descriptors: aberrations; fluoride glasses; optical glass; phosphate glasses; refractive index; specific heat of solids; thermal expansion; thermo-optical effects

L30 ANSWER 7 OF 9 HCPLUS COPYRIGHT 2003 ACS  
AN 1966:452725 HCPLUS  
DN 65:52725  
OREF 65:9859b-d  
TI Indirect **optical** absorption of AgCl-AgBr alloys  
AU Joesten, Burdette L.; Brown, Frederick C.  
CS Univ. of Illinois, Urbana  
SO Phys. Rev., (1966), 148(2), 919-27  
DT Journal  
LA English  
CC 8 (Crystallization and Crystal Structure)  
AB High-resolution measurements of the **optical** absorption edge of pure crystals of AgBr and AgCl are in good agreement with the theory of phonon-assisted indirect transitions. The indirect **optical** absorption of AgCl-AgBr mixed crystals has been studied between 4.2 and 77.degree. K. At 4.2.degree.K., the addn. of AgBr to AgCl causes the absorption edge to shift continuously from the pure AgCl threshold at 3.252 ev. to the pure AgBr threshold at 2.691 ev. Above 5.7 mole % AgBr in AgCl, the absorption coeff. increases steeply to values considerably greater than that of pure AgBr at the same wavelength. The effect of the alloying on the pure-crystal absorption spectra is somewhat different for the 2 extremes of mixing. In AgBr-rich mixed crystals (>90 mole % AgBr in AgCl), a **temp.-independent** component with a sharp threshold is observed at an energy precisely halfway between the indirect phonon-emission and phonon-absorption thresholds (which still appear with phonon energy 0.0082 ev. as in pure AgBr). This suggests that nonvertical transitions can occur in the alloy without the aid of phonons to conserve crystal momentum. The zero-phonon threshold is not so evident for dil. concns. of AgBr in AgCl, where a weak shoulder and tail extend approx. 0.07 ev. to longer wavelengths. Some comparison with theory is given, but present understanding of the band structure of the alloys is rather incomplete.  
IT 7783-90-6, Silver chloride  
(solid solns. with AgBr, **optical** absorption of)  
RN 7783-90-6 HCPLUS  
CN Silver chloride (AgCl) (9CI) (CA INDEX NAME)

Ag-Cl

L30 ANSWER 2 OF 9 HCAPLUS COPYRIGHT 2003 ACS  
AN 1997:557225 HCAPLUS  
DN 127:300707  
TI Time-of-flight mass spectrometric study on UV **laser** ablation of silver chloride  
AU Qin, Qizong; Zhou, Mingfei; Mao, Dunmin  
CS Institute of Laser Chemistry, Fudan University, Shanghai, 200433, Peop. Rep. China  
SO Applied Surface Science (1997), 119(3/4), 321-329  
CODEN: ASUSEE; ISSN: 0169-4332  
PB Elsevier  
DT Journal  
LA English  
CC 73-8 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)  
AB The formation of neutral and charged ablated species in the pulsed **laser** ablation of silver chloride at 355 nm has been investigated by a time- and angle-resolved quadrupole mass spectrometer as well as a **laser** ablation/ionization time-of-flight mass spectrometer. The dependence of the mass distribution of neutral species on **laser** fluence shows that the major species obsd. at a **laser** fluence of 0.17 J/cm<sup>2</sup> are Ag, AgCl and Ag<sub>2</sub>Cl, while Ag<sub>2</sub>Cl<sub>2</sub> and Ag<sub>3</sub>Cl<sub>3</sub> are detected as addnl. ablated species at **laser** fluence up to 0.4 J/cm<sup>2</sup>. The measured angular distribution of ablated AgCl can be fitted by a bicosine function: acos.vtheta.+(1-a)cosn.vtheta.. This result implies that the nonthermal process plays an important role in the UV **laser** ablation of silver chloride. On the other hand, both pos. and neg. charged species of Ag<sup>+</sup>, Ag<sub>2</sub>Cl<sub>2</sub><sup>+</sup>, Ag<sub>3</sub>Cl<sub>3</sub><sup>+</sup> and Cl<sup>-</sup>, AgCl<sub>2</sub><sup>-</sup> and Ag<sub>2</sub>Cl<sub>3</sub><sup>-</sup> are measured by **laser** ablation/ionization mass spectrometry at a **laser** fluence of 0.4 J/cm<sup>2</sup>. A proposed mechanism for the formation of ablated species in the AgCl **laser** ablation process is discussed.  
IT 7783-90-6, Silver chloride, processes  
RL: PEP (Physical, engineering or chemical process); PROC (Process)  
(time-of-flight mass spectrometric study on UV **laser** ablation of silver chloride)  
RN 7783-90-6 HCAPLUS  
CN Silver chloride (AgCl) (9CI) (CA INDEX NAME)

Ag—Cl

30 ANSWER 3 OF 9 HCAPLUS COPYRIGHT 2003 ACS  
AN 1979:78620 HCAPLUS  
DN 90:78620  
TI Optical absorption of off-center copper(1+) in cesium bromide  
AU Rambabu, B.; Ramasastry, C.; Chowdari, B. V. R.  
CS Dep. Phys., Indian Inst. Technol., Madras, India  
SO Physica Status Solidi B: Basic Research (1978), 90(2), 465-73  
CODEN: PSSBBD; ISSN: 0370-1972  
DT Journal  
LA English  
CC 73-3 (Spectra by Absorption, Emission, Reflection, or Magnetic Resonance,  
and Other Optical Properties)  
AB Optical absorption studies of Cu<sup>+</sup> in CsBr were made at 300 to 10  
K. Nine absorption bands at 6.15, 5.99, 5.80, 5.64, 5.44, 5.33, 5.09,  
4.95, and 4.87 eV could be resolved at liq. He temp. Their intensities  
are temp. independent. The obsd. spectrum is in  
agreement with the calcd. spectrum, if the Cu<sup>+</sup> ion replaces a Cs<sup>+</sup> ion and  
gets displaced along the .ltbbrac.111.rtbbrc. direction. The crystal  
field at Cu<sup>+</sup> ion is predominantly cubic (.delta.c = -0.45 eV) with a  
trigonal component (.delta.t = -0.055 eV) superposed on it.  
RN 7787-69-1 HCAPLUS  
CN Cesium bromide (CsBr) (9CI) (CA INDEX NAME)

Br—Cs

L30 ANSWER 4 OF 9 HCAPLUS COPYRIGHT 2003 ACS  
AN 1972:411732 HCAPLUS  
DN 77:11732  
TI Jahn-Teller effect on transition metal ions in silver halides. III.  
Interpretation  
AU Ulrici, W.  
CS Zentralinst. Elektronenphys., Dtsch. Akad. Wiss. Berlin, Berlin, Fed. Rep. Ger.  
SO Physica Status Solidi B: Basic Research (1972), 51(1), 129-38  
CODEN: PSSBBD; ISSN: 0370-1972  
DT Journal  
LA English  
CC 73-3 (Spectra by Absorption, Emission, Reflection, or Magnetic Resonance, and Other Optical Properties)  
AB The temp. dependence of the optical absorptions involving orbital doublets (Eg) split by dynamic Jahn-Teller effect (JTE) (measured on AgCl and AgBr doped with Ti<sup>3+</sup>, Fe<sup>2+</sup>, and Cr<sup>2+</sup>) is discussed. From the results obtained for excited Eg states the linear JT-coupling parameters and the frequencies of the JT-active .epsilon.g mode are derived. These .epsilon.g modes were localized around the impurity ion. The small and temp. independent oscillator strength of the transition between the JT-splitting levels of the Eg ground state (measured on Cr<sup>2+</sup>) is a consequence of the action of the dynamic JET. The weak increase of the JT-splitting .DELTA.E of the Eg ground state with increasing temp. is caused by the temp. dependence of the frequency of the .epsilon.g mode following from the thermal expansion of the crystal.  
IT 7783-90-6  
RL: PRP (Properties)  
(optical absorption by transition metal ion-contg., dynamic Jahn-Teller effect in relation to)  
RN 7783-90-6 HCAPLUS  
CN Silver chloride (AgCl) (9CI) (CA INDEX NAME)

Ag-Cl

13/9/1  
DIALOG(R)File 2:INSPEC  
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03209394 INSPEC Abstract Number: A88118396  
Title: UV/VIS-spectroscopic studies of cold condensed metal/metal halide films with and without matrix-isolation

Author(s): Gottwald, H.; Weil, K.G.

Author Affiliation: Inst. fur Phys. Chem., Tech. Hochschule Darmstadt, West Germany

Journal: Berichte der Bunsengesellschaft fur Physikalische Chemie vol.92, no.1 p.60-4

Publication Date: Jan. 1988 Country of Publication: West Germany

CODEN: BBPCAX ISSN: 0005-9021

U.S. Copyright Clearance Center Code: 0005-9021/88/0101-0060\$02.50/0

Language: English Document Type: Journal Paper (JP)

Treatment: Experimental (X)

Abstract: Films of about 200 nm thickness were prepared by vacuum deposition of halides onto fused silica **windows**, which were kept at 12 K by a closed cycle helium refrigerator. AgCl, CuCl, and TlCl films showed a structureless absorption edge which extended from about 350 nm to 200 nm. Annealing of the films below 170 K (150 K in the case of CuCl) for more than two hours gave no changes in the absorption spectra. Films which were annealed above this temperature showed at 12 K the exciton bands which are characteristic for the crystalline state of the materials. Cocondensation of 1 to 30 mol.% of metal Me to the halide MeCl gave rise to a broad absorption band around 300 nm which can be assigned to **surface** plasmon excitation of small particles. When the films are annealed, these bands disappear simultaneously with the crystallization of the matrix, and a broad band between 400 and 500 nm is formed. The authors assume that this band is due to Mie scattering of metallic colloid particles. The non-crystalline state is apparently a metastable ionic glass phase. Silver chloride, matrix isolated in Ar or Kr matrices on LiF **windows** shows an UV/VIS spectrum which is different from the gas spectrum. No new bands appear when it is cocondensed with silver atoms. (14 Refs)

Subfile: A

Descriptors: annealing; colloids; copper compounds; crystallisation; excitons; matrix isolation spectra; silver compounds; **surface** plasmons; thallium compounds; vacuum deposited coatings; visible and ultraviolet spectra of inorganic solids

Chemical Indexing:

AgCl sur - Ag sur - Cl sur - AgCl bin - **Ag bin** - Cl bin  
(Elements - 2)

CuCl sur - Cl sur - Cu sur - CuCl bin - Cl bin - Cu bin (Elements - 2)

TlCl sur - Cl sur - Tl sur - TlCl bin - Cl bin - Tl bin (Elements - 2)

LiF sur - Li sur - F sur - LiF bin - Li bin - F bin (Elements - 2)

Numerical Indexing: size 2.0E-07 m; temperature 1.2E+01 K

L30 ANSWER 8 OF 9 HCAPLUS COPYRIGHT 2003 ACS  
AN 1965:443403 HCAPLUS  
DN 63:43403  
OREF 63:7778b-d  
TI Differences in the behavior of crystals and glasses in the absorption of the far infrared (40-1500 .mu.) at liquid helium temperature  
AU Hadni, Armand; Claudel, Jacques; Gerbaux, Xavier; Morlot, Guy; Munier, Jean Marie  
CS Univ. Nancy, Fr.  
SO Appl. Opt. (1965), 4(4), 487-94  
DT Journal  
LA French  
CC 10 (Spectra and Some Other Optical Properties)  
AB Absorption spectra at liquid He temp. in the far ir are given for thick plates of CsI, CsBr, TlCl, KI, NaCl, InSb, KBr, CuCl, Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, MgO, and LaCl<sub>3</sub>. For a thickness of about 3 mm., all these crystals become quasitransparent at very low temp., although they are completely opaque at room temp. This supertransparency of crystals at low temp. gives several far-ir filters with remarkable cutoffs and many available materials to the spectroscopist in a part of the spectrum where only quartz and polyethene were usable up to now. This is also evidence that the main part of the absorption at room temp. comes from the lattice phonons. It decreases with their no. when the crystal is cooled (2-phonon difference process). The small absorption which remains in a few cases (KBr, NaCl, KI) could arise from the 2-phonon addn. process, which is nearly independent of temp. and gives much less efficient absorption. In the case of glasses, the absorption coeff. is higher by 2 or 3 orders of magnitude and stays const. when the glass is cooled. For quartz glass, the index of refraction also seemed invariant. An explanation is proposed in terms of 1 single phonon process, independent of temp. and allowed by the disorder characteristic of glassy states.  
IT 7787-69-1, Cesium bromide  
(spectrum (infrared and microwave) of, at low temp.)  
RN 7787-69-1 HCAPLUS  
CN Cesium bromide (CsBr) (9CI) (CA INDEX NAME)

Br-Cs

L29 ANSWER 1 OF 1 HCPLUS COPYRIGHT 2003 ACS  
AN 1986:24879 HCPLUS  
DN 104:24879  
TI Chlorination reaction and **laser** stimulated desorption from  
silver **surfaces**  
AU Sesselmann, W.; Chuang, T. J.  
CS Res. Lab., IBM, San Jose, CA, 95193, USA  
SO Surface Science (1985), 162(1-3), 1007-10  
CODEN: SUSCAS; ISSN: 0039-6028  
DT Journal  
LA English  
CC 67-3 (Catalysis, Reaction Kinetics, and Inorganic Reaction Mechanisms)  
Section cross-reference(s): 66  
AB Formation of AgCl on Ag **surfaces** exposed to Cl and **laser**  
stimulated desorption from chlorinated Ag **surfaces** were studied.  
For Cl exposures less than 107 L, a logarithmic time dependence of the  
Ag-Cl reaction is obsd. Due to effective subsurface diffusion, the  
**surface** layer is Ag enriched with respect to stoichiometric AgCl.  
At higher exposures, a t1/2 time dependence indicates that the diffusion  
process becomes reaction rate limiting and a stoichiometric AgCl  
**surface** layer is formed. UV/visible **laser** stimulated  
desorption of neutral Cl, Ag and AgCl species is obsd. for **laser**  
power less than 150 MW cm-2. The desorption process is **non-**  
**thermal** in nature. A desorption mechanism based on electronic  
excitations is discussed.  
IT 7783-90-6P, preparation  
RL: FORM (Formation, nonpreparative); PREP (Preparation)  
(formation of, in reaction of chlorine with silver **surface**,  
diffusion in relation to silver enrichment of **surface** in)  
RN 7783-90-6 HCPLUS  
CN Silver chloride (AgCl) (9CI) (CA INDEX NAME)

Ag-Cl

L30 ANSWER 6 OF 9 HCAPLUS COPYRIGHT 2003 ACS  
AN 1968:118228 HCAPLUS  
DN 68:118228  
TI Multiphonon structures in absorption spectra of silver halides containing iodide  
AU Kanzaki, Hiroshi; Sakuragi, Shiro; Ozawa, Shinobu  
CS Univ. Tokyo, Tokyo, Japan  
SO Journal of the Physical Society of Japan (1968), 24(3), 652  
CODEN: JUPSAU; ISSN: 0031-9015  
DT Journal  
LA English  
CC 73 (Spectra and Other Optical Properties)  
AB AgCl and AgBr crystals were grown from the melt under high vacuum and rapidly cooled from 300.degree. before measurements. I- (5 .times. 10-4 mole) in AgBr produces 2 components of addnl. absorption around the indirect exciton threshold, 2.692 ev. at 2.degree.K., of AgBr. The lower energy component (<2.70 ev.) shows multiphonon structures. The major series is located at 2.641, 2.654, 2.668, 2.681, and 2.694 ev., with an interval of 0.013 ev. The higher energy component (>2.70 ev.) shows similar structures. High resoln. data revealed addnl. weaker series and weaker satellites to the major series. For I- (3 .times. 10-4 mole) in AgCl, multiphonon structures are observed between the high-energy tail of the band (peak at 3.132 ev. at 4.2.degree.K.) and the indirect exciton threshold, 3.258 ev. at 4.2.degree.K., of AgCl. Structures at 3.207, 3.224, 3.242, and 3.260 ev. occur, with an interval of 0.018 ev. Each structure is accompanied with a weaker satellite. These multiphonon structures are smoothed out >20.degree.K. for AgBr, and >50.degree.K. for AgCl. The absorption components located at the low-energy side of the indirect exciton threshold can be understood as bound indirect exciton transitions. Their absorption strength is independent of temp. up to 77.degree.K. This suggests that the transition is allowed by momentum conservation owing to disorder, the presence of iodide. Observed multiphonon structures are due to simultaneous emission of phonons with the optical transition. The phonons participating in the major series (0.013 ev. for AgBr and 0.018 ev. for AgCl) are quasi-localized optical phonons from the presence of iodide.  
IT 7783-90-6  
RL: PRP (Properties)  
(spectrum (visible and uv) of, iodide-contg., multiphonon structure in)  
RN 7783-90-6 HCAPLUS  
CN Silver chloride (AgCl) (9CI) (CA INDEX NAME)

Ag—Cl

L30 ANSWER 1 OF 9 HCAPLUS COPYRIGHT 2003 ACS  
 AN 2001:451163 HCAPLUS  
 DN 135:53463  
 TI Silver halide photographic materials suitable for laser scanning exposure  
 IN Okazaki, Kentaro  
 PA Fuji Photo Film Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 34 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM G03C001-09  
 ICS G03C001-035; G03C001-34; G03C007-392  
 CC 74-2 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)  
 FAN.CNT 1

|      | PATENT NO.       | KIND | DATE     | APPLICATION NO. | DATE     |
|------|------------------|------|----------|-----------------|----------|
| PI   | JP 2001166411    | A2   | 20010622 | JP 1999-349451  | 19991208 |
| PRAI | JP 1999-349451   |      | 19991208 |                 |          |
| OS   | MARPAT 135:53463 |      |          |                 |          |

AB The materials have .gtoreq.1 layers comprising Ag halide emulsions contg. .gtoreq.90 mol% Ag chloride which is chem. sensitized with Au compds. in presence of 1.0 .times. 10-9-1.0 .times. 10-5 mol (per 1 mol Ag) .gtoreq.1 compd(s). selected from (A) R21SO2SM21 and R22SO2M22 (R21, R22 = aliph. group, arom. group, heterocyclic group; M21, M22 = cation) or (B) R31S2R32 (R31, R32 = aliph. group, arom. group; R31 + R32 may form a ring) at pH 4.0-5.6. The materials may be color photog. materials. Materials giving photographs of const. d. independent of temp. are obtained.

IT 7783-90-6, Silver chloride, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (photog. emulsions comprising Ag chloride sensitized with Au compds. in presence of sulfur compds.)

RN 7783-90-6 HCAPLUS  
 CN Silver chloride (AgCl) (9CI) (CA INDEX NAME)

Ag—Cl

12/9/3

DIALOG(R)File 2:INSPEC

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4442033 INSPEC Abstract Number: A9316-4278-003

Title: Influence of temperature on diffractive lens performance

Author(s): Behrmann, G.P.; Bowen, J.P.

Author Affiliation: US Army Res. Lab., Adelphi, MD, USA

Journal: Applied Optics vol.32, no.14 p.2483-9

Publication Date: 10 May 1993 Country of Publication: USA

CODEN: APOPAL ISSN: 0003-6935

U.S. Copyright Clearance Center Code: 0003-6935/93/142483-07\$05.00/0

Language: English Document Type: Journal Paper (JP)

Treatment: Theoretical (T)

Abstract: The thermal properties of lenses play an important role in the performance of optical systems. The authors discuss the effects of uniform temperature changes and thermal gradients on diffractive lens performance. Comparisons are made between the thermal sensitivity of **refractive** and diffractive lenses. Useful design equations are presented that describe focal length, phase coefficients, and diffraction efficiency as functions of temperature. They present important thermal data for a number of lens materials. The optothermal **expansion** coefficient is used to design **athermalized** lenses that combine **refractive** and diffractive surfaces. (17 Refs)

Subfile: A

Descriptors: lenses; light diffraction; optical constants; optical design techniques; optical systems; photothermal effects; sensitivity

2/21/03 09/536,460

13/9/11 (Item 5 from file: 350)  
DIALOG(R) File 350:Derwent WPIX  
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002570050

WPI Acc No: 1980-88069C/198049

Cuprous copper and/or silver halophosphate glasses - having high electrical conductivity for use in electrochemical devices

Patent Assignee: CORNING GLASS WORKS (CORG)

Number of Countries: 001 Number of Patents: 001

Patent Family:

| Patent No  | Kind | Date     | Applicat No | Kind | Date   | Week |
|------------|------|----------|-------------|------|--------|------|
| US 4226628 | A    | 19801007 |             |      | 198049 | B    |

Priority Applications (No Type Date): US 7961901 A 19790730

Abstract (Basic): US 4226628 A

Cuprous copper and/or silver halophosphate glasses have softening prints <400 degrees C, coefficients of thermal expansion (25-300 degrees C) >180x10<sup>-7</sup>/degrees C and room temp. electrical resistivities <108 ohm cm. The glass compsns. in % wt. oxide basis are specified in terms of areas defined in the ternary diagrams of the constituents such as Cu<sub>2</sub>O-CuCl-P<sub>2</sub>O<sub>5</sub>; Ag<sub>2</sub>O-AgCl-P<sub>2</sub>O<sub>5</sub>. Several halides may be present in the glass. The glasses may also be thermochromic.

Used in electrochemical devices such as batteries

Title Terms: CUPROUS; COPPER; SILVER; HALOPHOSPHATE; GLASSES; HIGH; ELECTRIC; CONDUCTING; ELECTROCHEMICAL; DEVICE

Derwent Class: L01; L03

International Patent Class (Additional): C03C-003/16

File Segment: CPI

Manual Codes (CPI/A-N): L01-A03C; L01-A07A; L01-A07B; L01-L05

13/9/10 (Item 4 from file: 350)  
 DIALOG(R)File 350:Derwent WPIX  
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003957362

WPI Acc No: 1984-102906/198417  
 XRAM Acc No: C84-043631  
 XRPX Acc No: N84-076399

Prod'n. of polarising glass - by drawing a blank clad with a glass having a lower viscosity at the drawing temp.  
 Patent Assignee: CORNING GLASS WORKS (CORG)  
 Inventor: LENTZ W; MORSE D L; NOLAN D A; SEWARD T P; SHAY G C  
 Number of Countries: 005 Number of Patents: 007

## Patent Family:

| Patent No   | Kind | Date     | Applicat No | Kind | Date     | Week   |   |
|-------------|------|----------|-------------|------|----------|--------|---|
| EP 105701   | A    | 19840418 | EP 83305805 | A    | 19830928 | 198417 | B |
| JP 59083951 | A    | 19840515 | JP 83180072 | A    | 19830928 | 198425 |   |
| US 4479819  | A    | 19841030 | US 82427732 | A    | 19820929 | 198446 |   |
| US 4486213  | A    | 19841204 | US 82427510 | A    | 19820929 | 198451 |   |
| EP 105701   | B    | 19870902 |             |      |          | 198735 |   |
| DE 3373301  | G    | 19871008 |             |      |          | 198741 |   |
| JP 90040619 | B    | 19900912 | JP 83180072 | A    | 19830928 | 199040 |   |

Priority Applications (No Type Date): US 82427732 A 19820929; US 82427510 A 19820929

## Abstract (Basic): EP 105701 A

Polarising glass is made by forming a core glass contg. Ag-contg. particles, cladding the core with a skin glass having a viscosity at the softening pt. of the core glass at least 50% less than the core glass, to form a laminate, stretching the laminate at a temp. above the annealing pt. of the core glass at a tensile stress in the core glass of more than 2000 psi; and elongating the Ag-contg. particles to an aspect ratio of at least 2:1.

Glass has good polarising properties at IR wavelengths, esp. 700-3000 nm, and has low haze, making it suitable for aphthalmic and optical use. Breaking during drawing is eliminated.

## Abstract (Equivalent): EP 105701 B

Polarising glass is made by forming a core glass contg. Ag-contg. particles, cladding the core with a skin glass having a viscosity at the softening pt. of the core glass at least 50% less than the core glass, to form a laminate, stretching the laminate at a temp. above the annealing pt. of the core glass at a tensile stress in the core glass of more than 2000 psi; and elongating the Ag-contg. particles to an aspect ratio of at least 2:1.

Glass has good polarising properties at IR wavelengths, esp. 700-3000 nm, and has low haze, making it suitable for aphthalmic and optical use. Breaking during drawing is eliminated.

Dwg.2/2

## Abstract (Equivalent): US 4486213 A

In the mfr. of a polarising glass a core glass contg. Ag-contg. particles is clad with a skin to form a laminate. The skin glass has a viscosity which is at least 50% than that of the core when at the softening point of the latter. The laminate is stretched at above the annealing point of the core, at or above the softening point temp. of the skin, and at a tensile stress of more than 2000 psi in thecore. The Ag-contg. particles are elongated to an aspect ratio of at least 1:1.

ADVANTAGE - Low haze level is obtd., making the glass suitable for optical and ophthalmic uses.

(8pp)

US 4479819 A

Glass article with good polarising properties in the IR region of the radiation spectrum is made from phase separable glasses or photochromic glasses contg. AgCl, AgBr or AgI. Glass contg. Ag and a chloride, bromide, or iodide is melted then cooled and cast into a predetermined shape. The prod. is heated to above the strain point but not higher than 50 deg. C above the softening point so that Ag halide particles of size 200-5000 angstroms form.

The article obtd. is elongated under stress at above the annealing temp. but below the temp. at which the glass has a viscosity of about 10 power 8 poises, so that the halide particles are elongated to an

aspect ratio of at least 5:1 and are aligned in the stress direction. The article is exposed to a reducing atmos. at above 250 deg. C but not higher than 25 deg. C above the annealing point so that a reduced surface layer at least 10 microns thick is formed in which Ag particles are formed with an aspect ratio more than 2:1 and which are deposited in and/or on the elongated particles.

ADVANTAGE - High quality polarising properties are obtd., esp. in wavelength range 700-3000 nm.

(8pp

Title Terms: PRODUCE; POLARISE; GLASS; DRAW; BLANK; CLAD; GLASS; LOWER;

VISCOSITY; DRAW; **TEMPERATURE**

Derwent Class: L01; V07

13/9/9 (Item 3 from file: 350)  
 DIALOG(R) File 350:Derwent WPIX  
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004142466

WPI Acc No: 1984-288006/198446  
 XRAM Acc No: C84-122403  
 XRPX Acc No: N84-215083

High expansion glass-ceramic article useful as ferrite support - is  
 photo-thermally crystallised and chemically machined

Patent Assignee: CORNING GLASS WORKS (CORG)

Inventor: MCALINN P

Number of Countries: 006 Number of Patents: 007

## Patent Family:

| Patent No   | Kind | Date     | Applicat No | Kind | Date     | Week   |   |
|-------------|------|----------|-------------|------|----------|--------|---|
| US 4480044  | A    | 19841030 | US 84575902 | A    | 19840201 | 198446 | B |
| EP 153026   | A    | 19850828 | EP 85300463 | A    | 19850124 | 198535 |   |
| JP 60180934 | A    | 19850914 | JP 8514151  | A    | 19850128 | 198543 |   |
| CA 1224956  | A    | 19870804 |             |      |          | 198735 |   |
| EP 153026   | B    | 19880309 |             |      |          | 198810 |   |
| DE 3561802  | G    | 19880414 |             |      |          | 198816 |   |
| JP 92037016 | B    | 19920618 | JP 8514151  | A    | 19850128 | 199229 |   |

Priority Applications (No Type Date): US 84575902 A 19840201

Cited Patents: US 2971853; US 3161528; US 4328305

Abstract (Basic): US 4480044 A

Glass-ceramic has coefft. of thermal expansion 120-160 x 10<sup>-7</sup> and comprises lithium metasilicate, lithium disilicate and quartz and/or cristobalite crystals dispersed in residual glassy matrix. 90% or more of compsn. comprises (wt.% oxide basis) 5.5-15 Li<sub>2</sub>O, 2-25 Al<sub>2</sub>O<sub>3</sub> and 60-85 SiO<sub>2</sub>, wherein Al<sub>2</sub>O<sub>3</sub>:Li<sub>2</sub>O is less than 1.7:1; included is at least one photosensitive metal as 0.001-0.03 Ag or 0.001-1 Cu, calculated respectively as Au, AgCl and Cu<sub>2</sub>O.

Pref. compsn. is 79.8 SiO<sub>2</sub>, 9.4 Li<sub>2</sub>O, 4 K<sub>2</sub>O, 3.9 Al<sub>2</sub>O<sub>3</sub>, 1.5 Na<sub>2</sub>O, 1 ZnO, 0.4 Sb<sub>2</sub>O<sub>3</sub>, 0.012 CeO<sub>2</sub>, 0.12 Ag and 0.0013 Au.

ADVANTAGE - Processing temps. for a known compsn. (Fotoceram(RTM) Code 8603 - US 2971 853) are reduced to modify crystal development and form prod. with coefft. of thermal expansion increased from 105 to 120-160 x 10<sup>-7</sup>/deg.C.

Abstract (Equivalent): EP 153026 B

A chemically-machinable glass-ceramic having a composition consisting essentially, expressed in terms of weight percent on the oxide basis, of 5.5-15% Li<sub>2</sub>O, 2-25% Al<sub>2</sub>O<sub>3</sub>, the weight ratio Al<sub>2</sub>O<sub>3</sub>:Li<sub>2</sub>O being less than 1.7:1, 60-85% SiO<sub>2</sub>, and at least one photosensitive metal in the indicated proportion selected from the group of 0.001-0.03% gold, computed as Au, 0.001-0.3% silver, computed as AgCl, and 0.001-1% copper, computed as Cu<sub>2</sub>O, the sum of those components constituting at least 90% by weight of the total composition, characterised in that it consists predominantly of lithium metasilicate, lithium disilicate and quartz and/or cristobalite crystals dispersed in a residual glassy matrix so that the glass-ceramic exhibits a coefficient of thermal expansion over the interval of 20-400 deg.C of 120-160 x 10<sup>-7</sup> power(-7) deg.C.

Title Terms: HIGH; EXPAND; GLASS; CERAMIC; ARTICLE; USEFUL; FERRITE; SUPPORT; PHOTO; THERMAL; CRYSTAL; CHEMICAL; MACHINING

Derwent Class: L01; L03; T03; W04

13/9/8 (Item 2 from file: 350)  
 DIALOG(R) File 350:Derwent WPIX  
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009736213  
 WPI Acc No: 1994-016063/199402  
 XRAM Acc No: C94-007669

Glass article with permanent colour avoiding hydrogen atmos. - contains silver and one or more halogen(s)  
 Patent Assignee: CORNING INC (CORG)  
 Inventor: BORRELLI N F; MORGAN D W; PRASSAS M; SMITH D W  
 Number of Countries: 008 Number of Patents: 006  
 Patent Family:

| Patent No   | Kind | Date     | Applicat No | Kind | Date     | Week   |   |
|-------------|------|----------|-------------|------|----------|--------|---|
| US 5275979  | A    | 19940104 | US 92969388 | A    | 19921030 | 199402 | B |
| EP 595002   | A1   | 19940504 | EP 93114719 | A    | 19930914 | 199418 |   |
| JP 6191878  | A    | 19940712 | JP 93247738 | A    | 19931004 | 199432 |   |
| CN 1086499  | A    | 19940511 | CN 93119704 | A    | 19931029 | 199529 |   |
| EP 595002   | B1   | 19970618 | EP 93114719 | A    | 19930914 | 199729 |   |
| DE 69311670 | E    | 19970724 | DE 611670   | A    | 19930914 | 199735 |   |
|             |      |          | EP 93114719 | A    | 19930914 |        |   |

Priority Applications (No Type Date): US 92969388 A 19921030  
 Abstract (Basic): US 5275979 A

A glass article that exhibits a permanent colour throughout its body comprises R2O, Al2O3, B2O3 and SiO2. The glass batch further contains (i) Ag and at least one halogen selected from Cl and Br, so that after heat treatment the glass will have AgCl and/or AgBr crystals and Ag metal particles dispersed throughout the glass, and (ii) at least one **thermal** reducing agent in its lowest valence state which is at least partially oxidised to its higher valence state by electron transfer to the Ag to produce Ag metal, thereby imparting a permanent colour to the glass.

Pref. the glass compsn., calculated in cation %, consists of 35-70% SiO2, 2-12% Al2O3, 20-35% B2O3, 8-30% R2O selected from 0-20% Li2O, 0-20% Na2O and 0-12% K2O, 0.01-1% of a **thermal** reducing agent selected from SnO2, Sb2O3 and As2O3, 0.225-1% Cl + Br, 0.10-0.5% Ag and 0-0.1% CuO.

USE/ADVANTAGE - The present invention relates to the development of colour in a glass contg. Ag and one or more halogens for use as a photochromic glass article. The present method has a number of advantages over previous methods for producing photochromic glasses, mainly that the need for treatment in a hydrogen-contg. atmos. is avoided, and also that the need for a separate **thermal** treatment is avoided and that the colour is produced throughout the glass and not just in the surface layer.

Dwg.0/4

Abstract (Equivalent): EP 595002 B

A method of producing a glass article having a fixed tint throughout the body of the article which comprises formulating and mixing a batch for an R2O-B2O3-Al2O3-SiO2 base glass, incorporating in the batch a source of silver, a source of at least one halogen other than fluorine, and a **thermal** reducing agent that exhibits at least two valence states and is present in an amount sufficient to partially reduce the silver halide phase, melting the batch and forming the article from the molten glass while essentially retaining the **thermal** reducing agent in its lowest valence state, **thermally** treating the article at a **temperature** in the range of 600-700 deg. C for up to one hour to precipitate a silver halide crystal phase in the glass and to activate a controlled reaction between the **thermal** reducing agent and the silver halide to reduce only a portion of the silver to the metallic state.

Dwg.0/4

13/9/5 (Item 1 from file: 144)  
DIALOG(R) File 144:Pascal  
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13187113 PASCAL No.: 97-0450879  
Two-dimensional small-angle X-ray scattering investigation of stretched  
borosilicate glasses

POLIZZI S; RIELLO P; FAGHERAZZI G; BARK M; BORRELLI N F  
Dipartimento di Chimica Fisica, Universita di Venezia, Dorsoduro 2137,  
30123 Venezia, Italy; Abt. Experimentelle Physik, Universitaet Ulm &  
Hasylab, Hamburg, Germany; Corning Glass Research and Development,  
Corning, New York 14831, United States

Journal: Journal of applied crystallography, 1997, 30 (p.4) 487-494  
ISSN: 0021-8898 CODEN: JACGAR Availability: INIST-13882;

354000068903550100

No. of Refs.: 20 ref.

Document Type: P (Serial) ; A (Analytic)

Country of Publication: Denmark

Language: English

A two-dimensional fit of a suitable model for interpreting small-angle X-ray scattering (SAXS) has been shown to be a valuable tool in obtaining quantitative microstructural information. The model is based on the hypothesis that dilute ellipsoidal particles are arranged parallel to each other. The method has been applied to two glasses containing oriented particles. The investigated materials are both alkali aluminoborosilicate glasses, thermally treated and redrawn at a temperature above their softening point. The Ag(Cl, Br) crystalline droplets, formed during the preliminary thermal treatment, assume, after drawing, a cigar-like shape, oriented in the stretching direction, and give the material birefringence properties. The volumetric particle distribution has an average of 22 x 70 nm and is skewed up to length values of about 1200 nm. The composition of the solid solution, determined by X-ray diffraction (XRD), is Ag(Cl<sub>0.5</sub>Br<sub>0.5</sub>). When the Ag(Cl,Br) particles on the surface are chemically reduced to Ag, a material with polarizing properties is obtained (Polarcor). For this sample, two distributions of particles have been found: one with an average of 18 x 230 nm and skewed up to 600 nm, and one, very sharp, of much shorter particles (14 x 30nm).

13/9/4 (Item 2 from file: 34)  
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci  
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01493367 Genuine Article#: HC908 Number of References: 42  
Title: ELECTRON-PARAMAGNETIC-RESONANCE STUDY OF SILVER-HALIDE  
PHOTOCROMIC-GLASSES - DARKENING MECHANISM  
Author(s): CAURANT D; GOURIER D; PRASSAS M  
Corporate Source: ECOLE NATL SUPER CHIM,CNRS,URA 1466,11 RUE PIERRE & MARIE  
CURIE/F-75231 PARIS 05//FRANCE//; ECOLE NATL SUPER CHIM,CNRS,URA 1466,11  
RUE PIERRE & MARIE CURIE/F-75231 PARIS 05//FRANCE//; CORNING  
EUROPE/F-77211 AVON//FRANCE/  
Journal: JOURNAL OF APPLIED PHYSICS, 1992, V71, N3 (FEB 1), P1081-1090  
Language: ENGLISH Document Type: ARTICLE  
Geographic Location: FRANCE  
Subfile: SciSearch; CC PHYS--Current Contents, Physical, Chemical & Earth  
Sciences  
Journal Subject Category: PHYSICS, APPLIED  
Abstract: The mechanism of darkening of standard silver halide photochromic  
glass is studied by electron paramagnetic resonance (EPR) of  
photogenerated divalent copper ions. A time resolution of the EPR  
spectra was obtained by recording the evolution with the irradiation  
time of the EPR intensity at various magnetic-field strengths. It is  
shown that only one copper species is photogenerated during darkening.  
This species is a Cu(II)-silver vacancy complex oriented along a [110]  
direction. The electron ground state has a predominantly dz2  
character. The activation energy of the formation of this complex,  $E =$   
 $0.06 \pm 0.01$  eV, is controlled by the migration of intersitial silver  
ions. It is also shown that the silver vacancy of the complex is  
generated during the hole trapping by the monovalent copper ion.  
Identifiers--KeyWords Plus: IONIC-CONDUCTIVITY; FLASH-PHOTOLYSIS;  
SPIN-RESONANCE; CHLORIDE; TEMPERATURE; CRYSTALS; CENTERS;  
AGCL(CU; AGBR

13/9/2 (Item 1 from file: 6)  
DIALOG(R) File 6:NTIS  
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0085462 NTIS Accession Number: AD-609 036/XAB  
Transmittance of Optical Materials at High Temperatures in the 1-  
to 12-Micron Range

(Rept. for Jun 61-Jul 63)

Gillespie, D. T. ; Olsen, A. L. ; Nichols, L. W.

Naval Ordnance Test Station China Lake Calif

Corp. Source Codes: 888888888

Report No.: NOTS-TP3586;; NAVWEPS-8558

Oct 64 2p

Journal Announcement: USGRDR6501

Presented at the 49th Annual Meeting of the Optical Society of America,  
New York, N. Y., 8 Oct 64.

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email at orders@ntis.fedworld.gov. NTIS is located at 5285 Port Royal Road,  
Springfield, VA, 22161, USA.

NTIS Prices: PC A02

Transmittance measurements of optical materials were made at 25, 100,  
200, 300, and 400C in the 1- to 12-micron range. A continuous proportioning  
**temperature** control system was designed to establish rapidly and to  
maintain precisely a given **temperature** level in specially constructed  
**high-temperature** cells. The following materials, which are  
dielectrics and semiconductors of potential use as windows and IRDOMES in  
optical systems at high **temperatures**, were selected: Corning  
glasses 0160, 8363, and 7905; water-free quartz; Barr and Stroud calcium  
aluminate, 37A and 39A; sapphire; ITRAN-1 and ITRAN-2; silver  
**chloride**; sodium chloride; silicon; and germanium. The results of the  
investigation are presented as transmittance vs. wavelength at the five  
**temperatures**. The transmittance of dielectrics remains relatively  
unaffected up to 400C; optical materials of this class are restricted in  
use at the higher **temperatures** only in the shift of the long  
wavelength transmittance limit. With the semiconductors silicon and  
germanium, the absorption edge is shifted to longer wavelengths and the  
over-all transmittance is greatly reduced with increase of  
**temperature**.

Identifiers: SODIUM CHLORIDE; SILVER CHLORIDE; CALCIUM  
ALUMINATES; ITRAN

13/9/1 (Item 1 from file: 2)  
DIALOG(R) File 2:INSPEC  
(c) 2003 Institution of Electrical Engineers. All rts. reserv.

03213608 INSPEC Abstract Number: A88118311  
Title: Optical properties of chemically reduced photochromic glasses  
Author(s): Borrelli, N.F.; Wedding, B.  
Author Affiliation: Corning Glass Res. & Dev., NY, USA  
Journal: Journal of Applied Physics vol.63, no.8, pt.1 p.2756-9  
Publication Date: 15 April 1988 Country of Publication: USA  
CODEN: JAPIAU ISSN: 0021-8979  
U.S. Copyright Clearance Center Code: 0021-8979/88/082756-04\$02.40  
Language: English Document Type: Journal Paper (JP)

Treatment: Experimental (X)

Abstract: Photochromic glasses subjected to reducing treatments at elevated **temperatures** develop a colored layer through the reduction of the silver halide phase. The nature of this process is investigated with respect to the **temperature** and time of the reduction treatment. An explanation of the color development is offered based on the comparison to an alternate way of producing the reduced silver absorption. In addition, the optical bleaching that is observed is discussed and a mechanism is proposed. (7 Refs)

Subfile: A

Descriptors: borosilicate glasses; light absorption; photochromism; reduction (chemical)

Identifiers: borosilicate glasses; photochromic glasses; reducing treatments; color development; optical bleaching; SiO<sub>2</sub>-B<sub>2</sub>O<sub>3</sub>/sub 2/-AgCl-AgBr

Class Codes: A7820W (Other optical properties of bulk materials); A8250 (Photochemistry and radiation chemistry)

Chemical Indexing:

SiO<sub>2</sub>B<sub>2</sub>O<sub>3</sub>AgClAgBr ss - B<sub>2</sub>O<sub>3</sub> ss - SiO<sub>2</sub> ss - Ag ss - B<sub>2</sub> ss - Br ss - Cl ss - O<sub>2</sub> ss - O<sub>3</sub> ss - Si ss - B ss - O ss (Elements - 6)

13/9/3 (Item 1 from file: 34)  
DIALOG(R) File 34:SciSearch(R) Cited Ref Sci  
(c) 2003 Inst for Sci Info. All rts. reserv.

02236291 Genuine Article#: KM233 Number of References: 48  
Title: BLEACHING MECHANISM OF SILVER-HALIDE PHOTOCROMIC-GLASSES  
Author(s): CAURANT D; GOURIER D; VIVIEN D; PRASSAS M  
Corporate Source: ECOLE NATL SUPER CHIM,CHIM APPL ETAT SOLIDE,CNRS,URA  
1466,11 RUE PIERRE & MARIE CURIE/F-75231 PARIS 05//FRANCE//; ECOLE NATL  
SUPER CHIM,CHIM APPL ETAT SOLIDE,CNRS,URA 1466,11 RUE PIERRE & MARIE  
CURIE/F-75231 PARIS 05//FRANCE//; CORNING EUROPE/F-77211  
AVON//FRANCE//

Journal: JOURNAL OF APPLIED PHYSICS, 1993, V73, N4 (FEB 15), P1657-1668  
ISSN: 0021-8979

Language: ENGLISH Document Type: ARTICLE

Geographic Location: FRANCE

Subfile: SciSearch; CC PHYS--Current Contents, Physical, Chemical & Earth Sciences

Journal Subject Category: PHYSICS, APPLIED

Abstract: **Thermal** bleaching of silver halide photochromic glasses is studied by electron paramagnetic resonance spectroscopy of photoinduced Cu(II) centers. During exposure to ultraviolet light, the only stable Cu(II) species is the (Cu(II)V(Ag))A center, which is a Cu(II)-silver vacancy complex with the vacancy in a nearest position. In the dark, this center rapidly decays via two parallel channels. The first involves the dissociation of the complex by displacement of the vacancy along a [110] direction, with an activation energy  $E_3=0.44$  eV and a frequency factor  $k_3(0)=3.4 \times 10(5)$  s $^{-1}$ . The second channel involves the conversion of the (Cu(II)V(Ag))A center into a (Cu(II)Cl-V(Ag))B center, where the silver vacancy is in the next nearest position along the [100] direction. This process occurs with an activation energy  $E_1=0.44$  eV and a frequency factor  $k_1(0)=3.1 \times 10(5)$  s $^{-1}$ . The (Cu(II)Cl-V(Ag))B center slowly decays by a vacancy hopping mechanism, with an activation energy  $E_2=0.22$  eV and a frequency factor  $k_2(0)=4.6$  s $^{-1}$ . To explain these two decay channels, it is proposed that the (Cu(II)V(Ag))A and (Cu(II)Cl-V(Ag))B centers annihilate via the formation of a Cu(I) ion and a neutral complex (Ag(II)V(Ag))A which migrates to the surface of the silver halide particle, where electron-hole recombination occurs.

Identifiers--KeyWords Plus: ELECTRON-SPIN-RESONANCE; IONIC-CONDUCTIVITY;  
FLASH-PHOTOLYSIS; CENTERS; CHLORIDE; AGCL(CU; COPPER

Research Fronts: 91-1552 001 (SURFACE-DIFFUSION OF HYDROGEN; ATOMIC

L40 ANSWER 3 OF 7 HCAPLUS COPYRIGHT 2003 ACS  
AN 1972:411732 HCAPLUS  
DN 77:11732  
TI Jahn-Teller effect on transition metal ions in silver halides. III.  
Interpretation  
AU Ulrici, W.  
CS Zentralinst. Elektronenphys., Dtsch. Akad. Wiss. Berlin, Berlin, Fed. Rep. Ger.  
SO Physica Status Solidi B: Basic Research (1972), 51(1), 129-38  
CODEN: PSSBBD; ISSN: 0370-1972  
DT Journal  
LA English  
CC 73-3 (Spectra by Absorption, Emission, Reflection, or Magnetic Resonance, and Other Optical Properties)  
AB The temp. dependence of the optical absorptions involving orbital doublets (Eg) split by dynamic Jahn-Teller effect (JTE) (measured on AgCl and AgBr doped with Ti<sup>3+</sup>, Fe<sup>2+</sup>, and Cr<sup>2+</sup>) is discussed. From the results obtained for excited Eg states the linear JT-coupling parameters and the frequencies of the JT-active .epsilon.g mode are derived. These .epsilon.g modes were localized around the impurity ion. The small and temp. independent oscillator strength of the transition between the JT-splitting levels of the Eg ground state (measured on Cr<sup>2+</sup>) is a consequence of the action of the dynamic JET. The weak increase of the JT-splitting .DELTA.E of the Eg ground state with increasing temp. is caused by the temp. dependence of the frequency of the .epsilon.g mode following from the thermal expansion of the crystal.  
IT 7783-90-6  
RL: PRP (Properties)  
(optical absorption by transition metal ion-contg., dynamic Jahn-Teller effect in relation to)  
RN 7783-90-6 HCAPLUS  
CN Silver chloride (AgCl) (9CI) (CA INDEX NAME)

Ag—Cl

13/9/12 (Item 6 from file: 350)  
 DIALOG(R) File 350:Derwent WPIX  
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002021942

WPI Acc No: 1978-34974A/197820

Photosensitive glass articles mfr., contg. silver and metal halide - by exposing to actinic radiation to form a latent image and then reexposure at elevated temp. to deposit a pattern of silver

Patent Assignee: CORNING GLASS WORKS (CORG)

Inventor: FERENCE J

Number of Countries: 009 Number of Patents: 009

Patent Family:

| Patent No   | Kind | Date     | Applicat No | Kind | Date   | Week |
|-------------|------|----------|-------------|------|--------|------|
| BE 860752   | A    | 19780510 |             |      | 197820 | B    |
| US 4092139  | A    | 19780530 |             |      | 197829 |      |
| DE 2800145  | A    | 19780928 |             |      | 197840 |      |
| NL 7802843  | A    | 19780919 |             |      | 197840 |      |
| JP 53113814 | A    | 19781004 |             |      | 197845 |      |
| BR 7801327  | A    | 19781114 |             |      | 197848 |      |
| FR 2383891  | A    | 19781117 |             |      | 197851 |      |
| GB 1557768  | A    | 19791212 |             |      | 197950 |      |
| CA 1099978  | A    | 19810428 |             |      | 198122 |      |

Priority Applications (No Type Date): US 77778160 A 19770316

Abstract (Basic): BE 860752 A

Glass article partly coloured by silver is made by (a) fusing a vitrifiable mixt. contg. an alkali fluoride and  $\geq 1$  of AgCl, AgBr and AgI; (b) shaping the glass, (c) exposing at least part of the article at ambient temp. to an actinic or high energy radiation; (d) heating at least the partly exposed part of the glass articles between the transformation point and the softening point to form nuclei; (e) reexposing part of the glass article at 200-410 degrees C for long enough for Ag to deposite and (f) cooling to ambient temp.

Method utilises polychromatic glasses and is for image pick up.

Improved intensity images can be obtd. without consecutive or interrupted heat treatments as in prior art

Title Terms: PHOTOSENSITISER; GLASS; ARTICLE; MANUFACTURE; CONTAIN; SILVER; METAL; HALIDE; EXPOSE; ACTINIC; RADIATE; FORM; LATENT; IMAGE; EXPOSE;

13/9/13 (Item 7 from file: 350)  
 DIALOG(R) File 350:Derwent WPIX  
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001208692

WPI Acc No: 1974-82589V/197448

**Silver chloride nucleated glass ceramic - is opaque and has low thermal expansion coefft**

Patent Assignee: CORNING GLASS WORKS (CORG)  
 Number of Countries: 006 Number of Patents: 006

## Patent Family:

| Patent No   | Kind | Date     | Applicat No | Kind | Date   | Week |
|-------------|------|----------|-------------|------|--------|------|
| BE 814858   | A    | 19741112 |             |      | 197448 | B    |
| DE 2422568  | A    | 19741128 |             |      | 197449 |      |
| US 3854963  | A    | 19741217 |             |      | 197501 |      |
| FR 2228732  | A    | 19750110 |             |      | 197509 |      |
| JP 50132017 | A    | 19751018 |             |      | 197550 |      |
| GB 1427634  | A    | 19760310 |             |      | 197611 |      |

Priority Applications (No Type Date): US 73359431 A 19730511

Abstract (Basic): BE 814858 A

A glass ceramic article is essentially free from alkali(ne earth) oxides e.g. MgO, CaO and SrO, and has a **thermal** expansion coeff. 0-25.10-7/degrees over the range 25-900 degrees C. Glass ceramic slices of thickness <3.175 mm are opaque and white in colour. The opacity results from a crystallinity of >75 wt. %, the greater part of the crystals being not >1 mu in size and comprising mainly solid solns. of zinc petalite and beta quartz. The compsn. of the article is (by wt.) 10-20% ZnO, 10-20% Al2O3, 50-75% SiO2 and <=1% AgCl as nucleating agent. The glass ceramic article is prepnd. by melting the constits.; cooling the melt to below the transformation region; simultaneously shaping the article; heating at 775-950 degrees C so that crystallisation can take place; and cooling the crystalline body to room temp.

Title Terms: SILVER; CHLORIDE; NUCLEATE; GLASS; CERAMIC; OPAQUE; LOW; THERMAL; EXPAND; COEFFICIENT

Derwent Class: L02

International Patent Class (Additional): C03B-000/00; C03C-003/22;

2/21/03 09/536,460

13/9/14 (Item 8 from file: 350)  
DIALOG(R) File 350:Derwent WPIX  
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000778699

WPI Acc No: 1971-20346S/197112

Photochromatic glass

Patent Assignee: CORNING GLASS WORKS (CORG)  
Number of Countries: 001 Number of Patents: 001

Patent Family:

| Patent No  | Kind | Date | Applicat No | Kind | Date   | Week |
|------------|------|------|-------------|------|--------|------|
| DE 1596764 | B    |      |             |      | 197112 | B    |

Priority Applications (No Type Date): US 65509164 A 19651122

Abstract (Basic): DE 1596764 B

Glass body with a photochromatic surface layer has a basic composition of (in % by wt): SiO<sub>2</sub>, 50-65, Al<sub>2</sub>O<sub>3</sub> 7-14, B<sub>2</sub>O<sub>3</sub> 15-22, R<sub>2</sub>O 5-15 (R<sub>2</sub>O Li<sub>2</sub>O 0-5, K<sub>2</sub>O 0-5, and Na<sub>2</sub>O 5-15), and at least one halogen (Cl 0.2-2, Br 0.1-3, and I 0.1-4; the total content of halogens should not exceed 5%), other additives (F, CuO, SrO, BrO, etc) should not exceed 5 degrees C. The surface layer contains crystals of a silver-halide (<1 μm), formed by introducing silver ions in exchange for alkali ions by contacting the surface with Ag. AgNO<sub>3</sub>, AgCl, AgBr, Ag<sub>2</sub>S or Ag<sub>2</sub>SO<sub>4</sub> in the temperature range from 100 degrees C below the stress point of the glass to 100 degrees above the softening point. Excellent photochromatic effect is produced.

Title Terms: PHOTOCHEMATIC; GLASS .

Derwent Class: L01

International Patent Class (Additional): C03C-021/00

File Segment: CPI

11/9/2 (Item 2 from file: 2)  
DIALOG(R) File 2:INSPEC  
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6156738 INSPEC Abstract Number: A1999-06-4285-001  
Title: Ultra-precision bonding for cryogenic fused-silica optics [for Gravity Probe-B]

Author(s): Gwo, D.-H.  
Author Affiliation: Hansen Exp. Phys. Lab., Stanford Univ., CA, USA  
Journal: Proceedings of the SPIE - The International Society for Optical Engineering Conference Title: Proc. SPIE - Int. Soc. Opt. Eng. (USA) vol.3435 p.136-42

Publisher: SPIE-Int. Soc. Opt. Eng,  
Publication Date: 1998 Country of Publication: USA  
CODEN: PSISDG ISSN: 0277-786X

SICI: 0277-786X(1998)3435L.136:UPBC;1-7  
Material Identity Number: C574-1998-265

U.S. Copyright Clearance Center Code: 0277-786X/98/\$10.00

Conference Title: Cryogenic Optical Systems and Instruments VIII

Conference Sponsor: SPIE

Conference Date: 20-21 July 1998 Conference Location: San Diego, CA, USA

Language: English Document Type: Conference Paper (PA); Journal Paper (JP)

Treatment: Experimental (X)

Abstract: This paper describes the state-of-the-art precision bonding technique for cryogenic fused-silica optics. It was developed for assembling the fused-quartz Gravity Probe-B science instrument, which will be used to prove or disprove Einstein's Theory of General Relativity with unprecedented accuracy and precision. This room-temperature bonding process is based on hydroxide catalysis. The resulting bonding strength is comparable with that of fused silica or fused quartz. The interface is typically 200 nm essentially limited by **surface figure** mismatch. It is as precise as optical contacting, as reliable as high-temperature frit bonding, as transparent as optical epoxies. So far it is the only bonding approach that meets all the stringent requirements for GP-B's applications at 2.5 K. (10 Refs)

Subfile: A

Descriptors: astronomical telescopes; catalysis; cryogenics; gravitational experiments; joining processes; optical elements; optical glass; optical workshop techniques

Identifiers: cryogenic fused-silica optics; ultra-precision bonding; fused-quartz Gravity Probe-B science instrument; room-temperature bonding process; hydroxide catalysis; **surface figure** mismatch; star tracking telescope; chemical bonding; 2.5 K; SiO<sub>2</sub>/sub 2

11/9/1 (Item 1 from file: 2)  
DIALOG(R) File 2:INSPEC  
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6840928 INSPEC Abstract Number: A2001-06-4285F-002  
Title: Measuring large aspherics using a commercially available  
3D-coordinate measuring machine

Author(s): Otto, W.; Matthes, A.; Schiehle, H.  
Author Affiliation: Technologiezentrum, Carl Zeiss, Oberkochen, Germany  
Journal: Proceedings of the SPIE - The International Society for Optical  
Engineering Conference Title: Proc. SPIE - Int. Soc. Opt. Eng. (USA)  
vol.4003 p.91-7

Publisher: SPIE-Int. Soc. Opt. Eng,  
Publication Date: 2000 Country of Publication: USA  
CODEN: PSISDG ISSN: 0277-786X  
SICI: 0277-786X(2000)4003L.91:MLAU;1-L  
Material Identity Number: C574-2000-209  
U.S. Copyright Clearance Center Code: 0277-786X/2000/\$15.00  
Conference Title: Optical Design, Materials, Fabrication, and Maintenance  
Conference Sponsor: SPIE; Eur. Southern Obs  
Conference Date: 27-29 March 2000 Conference Location: Munich, Germany  
Language: English Document Type: Conference Paper (PA); Journal Paper  
(JP)

Treatment: Practical (P); Experimental (X)  
Abstract: A CNC-controlled precision measuring machine is a very powerful  
tool in the optical shop not only to determine the **surface**  
**figure**, but also to qualify the radius of curvature and conic  
constant of aspherics. We used a commercially available 3D-coordinate  
measuring machine (CMM, ZEISS UPMC 850 CARAT S-ACC) to measure the shape of  
the GEMINI 1-m convex secondary mirrors at different lapping and polishing  
stages. To determine the measuring accuracy we compared the mechanical  
measurements with the results achieved by means of an interferometrical  
test setup. The data obtained in an early stage of polishing were evaluated  
in Zernike polynomials which show a very good agreement. The deviation  
concerning long wave rotational symmetrical errors was 20 nm rms, whereas  
the accuracy measuring of mid spatial frequency deviations was limited to  
about 100 nm rms. (8 Refs)

Subfile: A  
Descriptors: aspherical optics; astronomical telescopes; curvature  
measurement; grinding; measurement errors; mirrors; optical fabrication;

L40 ANSWER 5 OF 7 HCAPLUS COPYRIGHT 2003 ACS  
AN 1965:443403 HCAPLUS  
DN 63:43403  
OREF 63:7778b-d  
TI Differences in the behavior of crystals and glasses in the absorption of the far infrared (40-1500 .mu.) at liquid helium temperature  
AU Hadni, Armand; Claudel, Jacques; Gerbaux, Xavier; Morlot, Guy; Munier, Jean Marie  
CS Univ. Nancy, Fr.  
SO Appl. Opt. (1965), 4(4), 487-94  
DT Journal  
LA French  
CC 10 (Spectra and Some Other Optical Properties)  
AB Absorption spectra at liquid He temp. in the far ir are given for thick plates of CsI, CsBr, TlBr, TlCl, KI, NaCl, InSb, KBr, CuCl, Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, MgO, and LaCl<sub>3</sub>. For a thickness of about 3 mm., all these crystals become quasitransparent at very low temp., although they are completely opaque at room temp. This supertransparency of crystals at low temp. gives several far-ir filters with remarkable cutoffs and many available materials to the spectroscopist in a part of the spectrum where only quartz and polyethene were usable up to now. This is also evidence that the main part of the absorption at room temp. comes from the lattice phonons. It decreases with their no. when the crystal is cooled (2-phonon difference process). The small absorption which remains in a few cases (KBr, NaCl, KI) could arise from the 2-phonon addn. process, which is nearly independent of temp. and gives much less efficient absorption. In the case of glasses, the absorption coeff. is higher by 2 or 3 orders of magnitude and stays const. when the glass is cooled. For quartz glass, the index of refraction also seemed invariant. An explanation is proposed in terms of 1 single phonon process, independent of temp. and allowed by the disorder characteristic of glassy states.  
IT 7787-69-1, Cesium bromide  
(spectrum (infrared and microwave) of, at low temp.)  
RN 7787-69-1 HCAPLUS  
CN Cesium bromide (CsBr) (9CI) (CA INDEX NAME)

Br—Cs

12/9/9

DIALOG(R) File 2:INSPEC

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01152287 INSPEC Abstract Number: A78018029

Title: The effect of lithium and sodium oxides on the thermo-optic properties of silicate and phosphate glasses

Author(s): Molev, V.I.; Shchavelev, O.S.

Journal: Optiko-Mekhanicheskaya Promyshlennost vol.44, no.4 p.27-8

Publication Date: April 1977 Country of Publication: USSR

CODEN: OPMPAQ ISSN: 0030-4042

Translated in: Soviet Journal of Optical Technology vol.44, no.4 p. 212-13

Publication Date: April 1977 Country of Publication: USA

CODEN: SJOTBH ISSN: 0038-5514

Language: English Document Type: Journal Paper (JP)

Treatment: Experimental (X)

Abstract: A pseudobinary system method was applied to a study of the properties of the glasses; 64 glasses were synthesized in silicate and phosphate systems. Changes in **refractive index**, average dispersion, linear **expansion**, temperature coefficient of **refractive index** and thermo-optic constants are tabulated for addition of 1 mol.% of the oxides. Differences in partial properties of the two oxides in silicate and phosphate glasses are also listed. Sodium oxide is a good candidate for the production of **athermal** glasses of both types. (10 Refs)

Subfile: A

12/9/2

DIALOG(R)File 2:INSPEC

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5448178 INSPEC Abstract Number: A9702-4278-034

Title: **Expansion of an athermal chart into a multilens system with thick lenses spaced apart**

Author(s): Tamagawa, Y.; Tajime, T.

Author Affiliation: Inf. Technol. R&D Center, Mitsubishi Electr. Corp., Kanagawa, Japan

Journal: Optical Engineering vol.35, no.10 p.3001-6

Publisher: SPIE,

Publication Date: Oct. 1996 Country of Publication: USA

CODEN: OPEGAR ISSN: 0091-3286

SICI: 0091-3286(199610)35:10L.3001:EACI;1-J

Material Identity Number: O036-96012

U.S. Copyright Clearance Center Code: 0091-3286/96/\$6.00

Language: English Document Type: Journal Paper (JP)

Treatment: Theoretical (T)

Abstract: An **athermal** chart, which plots chromatic dispersive power and thermal dispersive power on a Cartesian coordinate, is one of the graphical design methods for achromatized and **athermalized** optical systems. We **expand** the ideas of an **athermal** chart into a multilens system that is composed of thick lenses spaced apart by weighting the ratio of the paraxial ray heights at the lenses or the surfaces to the lens power, the chromatic dispersive power, and the thermal dispersive power of each lens or surface. We describe the methods for treating air space and lens thickness on the **athermal** chart with two-component optical systems. It is clarified that the proposed method is effective for **athermalized** optical system design through the evaluation of an IR optical system in the 8- to 11-  $\mu$ m wavelength band. (17 Refs)

Subfile: A

Descriptors: aberrations; lenses; optical design techniques; optical dispersion; **refractive** index

Identifiers: **athermal** chart; multilens system; thick lenses;

12/9/1  
DIALOG(R) File 2:INSPEC  
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5718430 INSPEC Abstract Number: A9722-4255R-014, B9711-4320G-039  
Title: Ytterbium doped phosphate laser glasses  
Author(s): Shihbin Jiang; Myers, M.J.; Rhonehouse, D.L.; Hamlin, S.J.;  
Myers, J.D.; Griebner, U.; Koch, R.; Schonntagel, H.  
Author Affiliation: Kirge Inc., Hilton Head, SC, USA  
Journal: Proceedings of the SPIE - The International Society for Optical  
Engineering Conference Title: Proc. SPIE - Int. Soc. Opt. Eng. (USA)  
vol.2986 p.10-15  
Publisher: SPIE-Int. Soc. Opt. Eng,  
Publication Date: 1997 Country of Publication: USA  
CODEN: PSISDG ISSN: 0277-786X  
SICI: 0277-786X(1997)2986L.10:YDPL;1-Y  
Material Identity Number: C574-97163  
U.S. Copyright Clearance Center Code: 0277-786X/97/\$10.00  
Conference Title: Solid State Lasers VI  
Conference Sponsor: SPIE  
Conference Date: 10-11 Feb. 1997 Conference Location: San Jose, CA,  
USA  
Language: English Document Type: Conference Paper (PA); Journal Paper  
(JP)  
Treatment: Experimental (X)  
Abstract: Physical, spectral and laser properties of a new Yb<sup>3+</sup>/doped phosphate laser glass, QX/Yb, has been developed. This glass exhibits a low thermal expansion coefficient and a negative temperature coefficient of refractive index, resulting in an acceptable athermal behavior and an excellent thermal loading capability. The peak absorption and emission cross sections of Yb<sup>3+</sup> were measured to be  $1.06 \times 10^{-20} \text{ cm}^2$  and  $0.903 \times 10^{-20} \text{ cm}^2$ , respectively. The concentration quenching and the influence of the OH<sup>-</sup>/content on fluorescence lifetimes were examined. Excellent laser performance with a slope efficiency of 49% and a maximum output power of 400 mW was demonstrated. (11 Refs)  
Subfile: A B  
Descriptors: fluorescence; laser beams; optical glass; phosphate glasses; radiation quenching; radiative lifetimes; refractive index; solid lasers; thermal expansion; ytterbium

9/9/1

DIALOG(R) File 2:INSPEC

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6063945 INSPEC Abstract Number: B9812-2550G-019

Title: Advances in the reduction and compensation of film stress in high-reflectance multilayer coatings for extreme ultraviolet lithography

Author(s): Mirkarimi, P.B.; Montcalm, C.

Author Affiliation: Adv. Microtechnol. Program, Lawrence Livermore Nat. Lab., CA, USA

Journal: Proceedings of the SPIE - The International Society for Optical Engineering Conference Title: Proc. SPIE - Int. Soc. Opt. Eng. (USA) vol.3331 p.133-48

Publisher: SPIE-Int. Soc. Opt. Eng,

Publication Date: 1998 Country of Publication: USA

CODEN: PSISDG ISSN: 0277-786X

SICI: 0277-786X(1998)3331L.133:ARCF;1-#

Material Identity Number: C574-98164

U.S. Copyright Clearance Center Code: 0277-786X/98/\$10.00

Conference Title: Emerging Lithographic Technologies II

Conference Sponsor: SPIE

Conference Date: 23-25 Feb. 1998 Conference Location: Santa Clara, CA, USA

Language: English Document Type: Conference Paper (PA); Journal Paper (JP)

Treatment: Experimental (X)

Abstract: Due to the stringent **surface figure** requirements for the multilayer-coated optics in an extreme ultraviolet (EUV) projection lithography system, it is desirable to minimize deformation due to the multilayer film stress. However, the stress must be reduced or compensated without reducing EUV reflectivity, since the reflectivity has a strong impact on the throughput of a EUV lithography tool. In this work we identify and evaluate several leading techniques for stress reduction and compensation as applied to Mo/Si and Mo/Be multilayer films. The measured film stress for Mo/Si films with EUV reflectances near 67.4% nm is approximately -420 MPa, while it is approximately +330 MPa for Mo/Be films with EUV reflectances near 69.4% at 11.4 nm. Varying the Mo-to-Si ratio can be used to reduce the stress to near zero levels, but at a large loss in EUV reflectance. The technique of varying the base pressure yielded a 10% decrease in stress with a 2% decrease in reflectance for our multilayers. Post-deposition annealing was performed and it was observed that while the cost in reflectance is relatively high to bring the stress to near zero levels, the stress can be reduced by 75% with only a 1.3% drop in reflectivity at annealing temperatures near 200 degrees C. A study of annealing during Mo/Si deposition was also performed; however, no practical advantage was observed by heating during deposition. A new **non-thermal** buffer-layer technique was developed to compensate for the effects of stress. Using this technique with amorphous silicon and Mo/Be buffer-layers it was possible to obtain Mo/Be and Mo/Si multilayer films with near zero net film stress and less than a 1% loss in reflectivity. For example a Mo/Be film with 68.7% reflectivity at 11.4 nm and a Mo/Si film with 66.5% reflectivity at 13.3 nm were produced with net stress values less than 30 MPa. (38 Refs)

Subfile: B

Descriptors: annealing; beryllium; internal stresses; molybdenum; optical films; photolithography; reflectivity; silicon

Identifiers: film stress; multilayer coating; extreme ultraviolet projection lithography; **surface figure**; deformation; reflectivity; EUV reflectance; annealing; buffer layer; 11.4 nm; 13.4 nm; 200 C; Mo-Si; Mo-Be

Class Codes: B2550G (Lithography); B4190F (Optical coatings and filters)

Chemical Indexing:

Mo-Si int - Mo int - Si int - Mo el - Si el (Elements - 1,1,2)

Mo-Be int - Be int - Mo int - Be el - Mo el (Elements - 1,1,2)

Numerical Indexing: wavelength 1.14E-08 m; wavelength 1.34E-08 m; temperature 4.73E+02 K

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11/9/6 (Item 1 from file: 94)  
DIALOG(R) File 94:JICST-EPlus  
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03187313 JICST ACCESSION NUMBER: 97A0146577 FILE SEGMENT: JICST-E  
Performance of a Convenient Profiler for Measurement of Mirror

**Surface Figure.**

SUGAWARA HIDENAO (1); YANAGIHARA MIHIRO (2); ASAOKA SEIJI (3); MAEZAWA HIDEKI (3)

(1) Gunma Univ., Fac. of Educ.; (2) Tohoku Univ.; (3) Natl. Lab. for High Energy Phys.

Hoshako (Journal of the Japanese Society for Synchrotron Radiation Research), 1996, VOL.9, NO.4, PAGE.335-343, FIG.9, REF.9

JOURNAL NUMBER: L0956AAP ISSN NO: 0914-9287

UNIVERSAL DECIMAL CLASSIFICATION: 681.7 535-34

LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Journal

ARTICLE TYPE: Original paper

MEDIA TYPE: Printed Publication

**ABSTRACT:** In order to estimate mirror **surface figures** over rather wide area, we have developed a convenient profiler. It is usable even if a mirror is under exposure to synchrotron radiation. It consists of a small-sized laser source and a position sensitive detector which are mounted on X and Y platforms driven by stepping motors. After the laser light is incident on a mirror surface, the reflected laser light is detected with the position sensitive detector. When a set of the laser source and the detector is scanned parallel to the mirror surface, we can know variation in position on the detector surface where the laser light reflected from the mirror surface falls. Since this position variation arises from variation in the angle of reflection of the laser light on the mirror surface, it is reduced to a slope curve for the mirror surface parallel to an axis along which the laser light is scanned. Therefore, we can derive the surface profile by integrating the slope curve along the scanning axis. The Application of the profiler to mirrors under exposure to high power synchrotron radiation is described. (author abst.)

DESCRIPTORS: reflecting mirror; synchrotron radiation; beam line; in situ observation; shape measurement; surface quality; laser application; silicon carbide; undulator; thermal deformation

BROADER DESCRIPTORS: mirror; optical system; bremsstrahlung; electromagnetic wave; wave motion; electromagnetic radiation; radiation; radioactive ray; **nonthermal** radiation; beam technique;

11/9/5 (Item 1 from file: 8)  
DIALOG(R)File 8:Ei Compendex(R)  
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05395855 E.I. No: E2099104847451  
Title: Interferometric testing of the VLT tertiary mirrors  
Author: Schulte, Stefan; Doerband, Bernd; Schillke, Frank; Wiedmann, Wolfgang; Michel, Alain  
Corporate Source: Carl Zeiss, Oberkochen, Ger  
Conference Title: Proceedings of the Interferometry '99: Applications  
Conference Location: Pultusk, Pol Conference Date: 19990920-19990923  
Sponsor: SPIE; KBN; SEM; DGaO; WLT  
E.I. Conference No.: 55761  
Source: Proceedings of SPIE - The International Society for Optical Engineering v 3745 1999. p 14-24  
Publication Year: 1999  
CODEN: PSISDG ISSN: 0277-786X  
Language: English  
Document Type: JA; (Journal Article) Treatment: G; (General Review)  
Journal Announcement: 9911W4  
Abstract: The tertiary mirrors of the Very Large Telescope (VLT), one of the most powerful astronomical telescope systems, were manufactured and tested at Carl Zeiss. These components are lightweight elliptical plane mirrors with diameters of 1250 mm and 880 mm for the long and short axis, respectively. A particular challenge of this project was the outer rim specification of 200 nm peak-to-valley mirror surface deviation. This value had to be obtained under all operational load cases differing in the influence of gravity on the lightweight structure of the mirror. The mirror had to be tested on its support cell. For the absolute calibration of the large plane mirror surface a Ritchey-Common test was performed at two different angular positions. The test setup was adapted as close as possible to the operational position of the mirror in the telescope. A special algorithm for the calculation of the **surface figure** error from the wavefront data sets was developed. The results and special challenges of the absolute calibration procedure of the mirror surface will be presented and discussed. (Author abstract) 3 Refs.  
Descriptors: \*Optical telescopes; Mirrors; Optical testing; Interferometry; Surface measurement; Algorithms; Calibration  
Identifiers: Very large telescopes (VLT)  
Classification Codes:  
741.3 (Optical Devices & Systems); 941.3 (Optical Instruments); 941.4 (Optical Variables Measurements); 943.2 (Mechanical Variables Measurements)  
741 (Optics & Optical Devices); 941 (Acoustical & Optical Measuring Instruments); 943 (Mechanical & Miscellaneous Measuring Instruments)  
74 (OPTICAL TECHNOLOGY); 94 (INSTRUMENTS & MEASUREMENT)

11/9/4 (Item 1 from file: 6)  
DIALOG(R) File 6:NTIS  
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2107792 NTIS Accession Number: DE98058762/XAB

Advances in the reduction and compensation of film stress in high-reflectance multilayer coatings for extreme ultraviolet lithography applications

Mirkarimi, P. B.

USDOE, Washington, DC.

Corp. Source Codes: 888888888

Report No.: UCRL-JC-128293

20 Feb 98 19p

Languages: English Document Type: Conference proceeding

Journal Announcement: GRAI9907; ERA9901

Joint MMM-intermag conference (7th).

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NTIS Prices: PC A03/MF A01

Country of Publication: United States

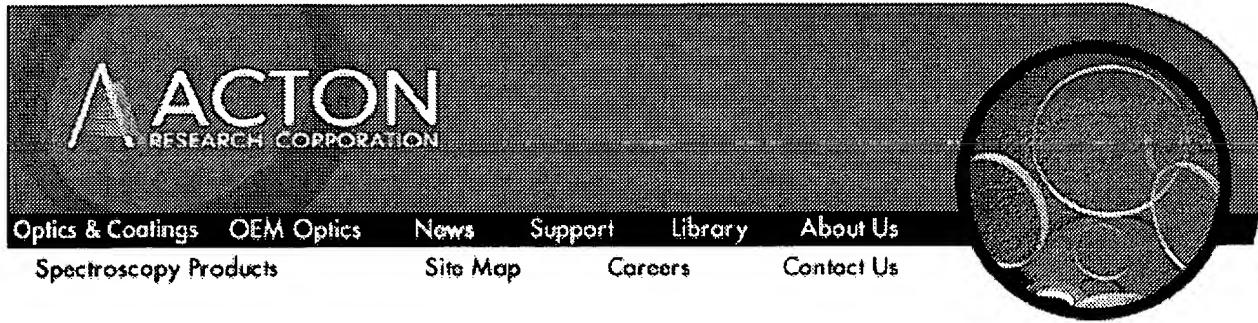
Contract No.: W-7405-ENG-48

Due to the stringent surface figure requirements for the multilayer-coated optics in an extreme ultraviolet (EUV) projection lithography system, it is desirable to minimize deformation due to the multilayer film stress. However, the stress must be reduced or compensated without reducing EUV reflectivity, since the reflectivity has a strong impact on the throughput of a EUV lithography tool. In this work we identify and evaluate several leading techniques for stress reduction and compensation as applied to Mo/Si and Mo/Be multilayer films. The measured film stress for Mo/Si films with EUV reflectances near 67.4% at 13.4 nm is approximately - 420 MPa (compressive), while it is approximately +330 MPa (tensile) for Mo/Be films with EUV reflectances near 69.4% at 11.4 nm. Varying the Mo-to-Si ratio can be used to reduce the stress to near zero levels, but at a large loss in EUV reflectance (&gt; 20%). The technique of varying the base pressure (impurity level) yielded a 10% decrease in stress with a 2% decrease in reflectance for our multilayers. Post-deposition annealing was performed and it was observed that while the cost in reflectance is relatively high (3.5%) to bring the stress to near zero levels (i.e., reduce by 100%), the stress can be reduced by 75% with only a 1.3% drop in reflectivity at annealing temperatures near 200(degrees)C. A study of annealing during Mo/Si deposition was also performed; however, no practical advantage was observed by heating during deposition. A new non-thermal (athermal) buffer-layer technique was developed to compensate for the effects of stress. Using this technique with amorphous silicon and Mo/Be buffer-layers it was possible to obtain Mo/Be and Mo/Si multilayer films with a near zero net film stress and less than a 1% loss in reflectivity. For example a Mo/Be film with 68.7% reflectivity at 11.4 nm and a Mo/Si film with 66.5% reflectivity at 13.3 nm were produced with net stress values less than 30 MPa.

Descriptors: \*Coatings; Ultraviolet Radiation; Reflectivity; Molybdenum Alloys; Silicon Alloys; Beryllium Alloys; Annealing; Meetings

Identifiers: EDB/360100; NTISDE

Section Headings: 71E (Materials Sciences--Coatings, Colorants, and Finishes); 46C (Physics--Optics and Lasers); 82B (Photography and Recording Devices--Photographic Techniques and Equipment); 49E (Electrotechnology--Optoelectronic Devices and Systems)



## Frequently Asked Optics Questions

### 2) What is "Surface Figure" and why is it important?

Along with the selection of the proper substrate material, actual damage threshold and long lifetime can greatly depend on the surface preparation of the optic. Most excimer laser optics are specified by surface figure and surface quality.

Surface figure is a measurement of the deviation from an ideal surface in terms of waves, peak to valley. This is typically specified as 1/10th wave or better at 633 nm for most surfaces of excimer optics. For some special applications, surface figure specifications can be even greater, in the range of 1/20th wave or better.

Surface quality is defined as the number of actual flaws in an optical surface in terms of scratches and digs, based on military specifications. Surface quality of excimer optics is most often specified as 20-10 or better for optimum, low scatter performance of the optics. Precise fabrication techniques designed to produce these types of surfaces, on crystalline materials such as MgF<sub>2</sub> and CaF<sub>2</sub>, contribute to the overall optical performance of the excimer laser.



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